

Human Anatomy & Physiology Reactions versus Reflexes Lab

Name _____

Background: Have you ever had to react to a situation where something was flying at your face? If so, you probably used two of our body's most important – as well as fastest – mechanisms for protecting your eyes: reflexes and reactions. You automatically closed your eyes as the object approached and you may have ducked your head out of the way.

Closing your eyes automatically is a **reflex**. A reflex is an **autonomic** (or involuntary) response to a stimulus that helps to protect the body from injury. Reflexes are very rapid and of short duration since they do not rely upon the brain for “decision making”. This entire “decision” to react occurs in the spinal cord or brain stem.

Other types of reflexes happen all the time. In fact, your last visit to the doctor probably involved one. When struck just below the knee with a small hammer, your lower leg “kicks” up to protect the ligaments inside the knee capsule and to keep your quadriceps from being stretched too far. If you pick up something very hot, you may drop it to prevent a serious burn. All of these are examples of reflexes.

Ducking your head out of the way is a **reaction**. A reaction is a **somatic** (voluntary) response to a stimulus. This decision involves the brain and requires the brain to make a decision about what your response will be. A reaction is the deliberate or voluntary changing of the body's position to respond to the stimulus. Reactions may also be very quick and of short duration, but they aren't always.

Purpose: the purpose of this laboratory experience is:

- to understand the difference between a reflex and a reaction
- to demonstrate some human reflexes
- to be able to calculate your reaction time

Procedure:

Patellar or Knee Jerk Reflex

1. The subject is to sit on the edge of the lab table with the legs able to swing freely. (One partner will be the subject first and the other partner the tester, then you'll switch.)
2. Once the legs are relaxed and swing freely, the tester should use the side of their hand to “tap” the subject just below the kneecap. What happened? Record your results in the data table.
3. Now have the person sit with their leg straight out. Tap the knee in the same place. Observe and record your results.
4. Switch places with your partner and repeat steps 1-3. Record the data for both partners in your data table.

Papillary Reflex

5. Have the subject close his or her eyes for one minute (no peeking). After one minute, stare into the subject's eyes and tell him/her to open his/her eyes. Observe and record what happens to the pupils.
6. After the subject has been tested switch places and repeat with the partner.

Babinski's Response

7. Have the subject remove one shoe and sock. Have the subject sit on the lab table with his/her foot extending just over the edge. Using a pen cap or fingernail, the experimenter is to scratch the subject's foot in one smooth stroke motion from toe to heel.
8. Describe the response in the toes in your data table.

9. After the subject has been tested switch places and repeat with the partner.

Blink Reflex

10. Have the subject hold a sheet of clear plastic (transparency) in front of their face. Crumple up a small piece of paper and toss it toward their eyes. Observe what happens and record your data.

11. After the subject has been tested switch places and repeat with the partner.

Data for Reflex Testing:

Stimulus	My Response	Partner's Response
Knee Tap (bent leg)		
Knee Tap (straight leg)		
Pupil Response to Light		
Touching toe to heel		
Object thrown towards face		

Procedure for Reaction Time:

1. Have the subject sit comfortably with their forearm resting on a desk. With their index finger and thumb about two inches apart. Hold a ruler at the 30 cm end and have the "zero" (0 cm) mark lined up between your partner's finger and thumb.
2. Without warning, release the ruler and have them grasp it as quickly as they can. Record the distance the meter stick traveled to where the thumb meets the stick. Repeat the trial three more times and record your data.
3. Switch roles and repeat steps 1 and 2.
4. Determine the average distance that the meter stick fell for all of the trials. Using that average, calculate the TIME it took for you to react and grab the ruler using the equation on the next page.

Data for Reaction Time:

Trial	Distance (cm) of Fall	
	Mine	Partner's
1		
2		
3		
4		
Average		

Calculation of Reaction Time

$$t = \sqrt{(2d/a)}$$

Where...

t = reaction time

d = average distance of fall

a = acceleration due to gravity = 980 cm/s^2

Conclusion:

1. In the space below calculate your reaction time and your partner's reaction time. Show your work for each.

Mine:

Partner's:

2. Why doesn't the patellar reflex happen when your leg is straight?

3. How does the patellar reflex protect us?

4. How does the papillary response prevent injury? What would happen without it?
5. Why is the blinking response effective? What kind of job would you have where you used this reflex quite often?
6. What kind of job would you have where you would want to stop the blinking response?
7. Name three sports or occupations where having a fast reaction time is important.
8. Give three examples of things that could slow down your reaction time or reflexes.
9. Say that a person catches a meter stick very slowly when their hands are cold. If that person was able to average catching the meter stick at 93 cm, what is their reaction time? Show your work below.